IN THE CLAIMS

Please amend claims 6, 10-11, 14, 18, 21-22, 25-26, 29, 33-36, 41, 43, 45, 62-63, 65-67, 85-89, 98-99, 102 and 104, and add a new claim 106 as follows:

1-5. (Cancelled)

6. (Currently Amended) A system for detecting a signal, comprising:

a receiver for receiving a wideband signal to be processed;

a sub-band conversion module for converting the wideband signal into a plurality of sub-band signals to be processed;

a channelizing module for Fast Fourier Transform channelizing said plurality of sub-band signals into a respective plurality of complex spectral components;

a processing module for signal processing said plurality of complex spectral components, including a means for determining the presence of at least one signal of interest based on multiple time averaging analysis of said plurality of complex spectral components; and

a high speed data router ~~as means~~ coupling each module to one another for digitally routing respective ~~plurality of module~~ data between said modules,

wherein said processing module includes a plurality of channel processors operatively connected to said data router so as to receive corresponding ones of said plurality of complex spectral components, each of said channel processors being formed so as to determine the presence of signal activity and perform demodulation of said at least one signal of interest within the corresponding complex spectral component thereof,

wherein said means for determining the presence of at least one signal of interest includes, within each of said plurality of channel processors:

a First-In-Tap-Out (FITO) delay memory operatively connected to receive and store said corresponding complex spectral component from said data router,

a detection processor for conducting spectral filtering by convolution of said corresponding complex spectral components stored in said FITO delay memory, and for generating spectral activity parameter data on said corresponding complex spectral

components based on multiple spectral magnitude running averages on said corresponding complex spectral components,

at least one signal demodulation and recognition processor for filtering and demodulating said corresponding complex spectral components stored in said FITO delay memory based on the spectral activity parameter data generated by said detection processor and further refines and measures signal parameter data; and

a real time controller for controlling the creation and operation of said at least one signal demodulation and recognition processor based on the spectral activity parameter data generated by said detection processor.

7. (Original) A system according to claim 6, wherein said means for determining the presence of at least one signal of interest further includes, within each of said plurality of channel processors:

a plurality of signal demodulation and recognition processors for filtering and demodulating said corresponding complex spectral components stored in said FITO delay memory based on the spectral activity parameter data generated by said detection processor.

8-9. (Cancelled)

10. (Currently Amended) A system according to claim 6, wherein said [[means]] <u>at least one signal demodulation and recognition processor</u> for filtering, demodulating, and refining parameter data <u>of said corresponding complex spectral components</u> of at least one signal of interest further includes, within each of said plurality of demodulation and recognition processors:

a two-stage synthesis filter for receiving sub-set of complex spectral components of signal activity from delay-memory storing performing frequency domain filtering, hyperchannel frequency tuning and transforming hyperchannel spectral data into time-domain data;

at least one synthesis filter receiver for signal component filtering and hyperchannel frequency tuning; and

a synthesis receiver controller and demodulation processor for performing a simultaneous plurality of demodulations, and comparing successful demodulation parameters to parameters of signals of interest provided by system control computer.

11. (Currently Amended) A method for detecting a signal comprising the steps of:

receiving a wideband signal for processing;

converting the wideband signal into a plurality of sub-band signals to be processed;

Fast Fourier Transform channelizing said plurality of sub-band signals into a respective plurality of complex spectral components; and

determining the presence of <u>said</u> at least one subset of adjacent spectral components based on multiple running averages and a time delayed average of said plurality of real spectral components.

12. (Original) A method according to claim 11, wherein said step of converting the wideband signal includes analog-to-digital converting the received wideband signal, digitally down converting the digitally converted wideband signal so as to generate the plurality of sub-bands of the digitally converted wideband signal, and outputting said plurality of sub-band signals for channelizing.

13. (Original) A method according to claim 11, wherein said step of channelizing said plurality of sub-band signals includes Fast Fourier Transform (FFT) processing said plurality of sub-band signals via a corresponding plurality of FFT channels so as to generate a corresponding plurality of the complex spectral components, and outputting said plurality of complex spectral components for determining the presence of at least one subset of adjacent spectral components of signal activity.

14. (Currently Amended) A method according to claim 11, wherein said step of determining the presence of at least one subset of adjacent spectral components includes storing said complex spectral components, conducting spectral filter convolution of said complex spectral components, converting said complex spectral

components to real spectral components, and generating spectral activity parameter data based on said real spectral components.

15. (Original) A method according to claim 14, wherein said step of filter convolution of said complex signal samples includes applying a convolution shaping filter incorporating only real weights.

16. (Original) A method according to claim 14, wherein said step of filter convolution of said complex signal samples includes applying a Blackman-Harris cosine filter.

17. (Previously Presented) A method according to claim 14, wherein said step of generating spectral parameter data includes generating spectral magnitude running averages and delayed running averages on said real spectral components.

18. (Currently Amended) A method according to claim 14, wherein said step of generating spectral ~~parameters on said complex signal samples based on said running spectral averages~~ activity parameter data based on said real spectral components includes generating parameter data on at least one of frequency, time of start, bandwidth, and signal modulation type of a signal of interest.

19. (Previously Presented) A method according to claim 17, wherein said step of Fast Fourier Transform (FFT) channelizing processes said plurality of sub-band signals via a corresponding plurality of FFT channels including hyperchannelizing said plurality of sub-band signals so as to generate complex spectral components with bandwidths narrower than a signal-of-interest bandwidth.

20. (Original) A method according to claim 19, wherein said step of hyperchannelizing said plurality of sub-band signals includes generating complex time-overlapped spectral data.

21. (Currently Amended) A method according to claim 17, wherein said step of generating spectral magnitude running averages on said ~~complex~~ real spectral

components includes generating at least a short-term running average, a medium-term running average and a delayed long-term average.

22. (Currently Amended) A method according to claim 17, wherein said step of generating spectral magnitude running averages on said ~~complex~~ real spectral components further includes generating a long-term running average.

23. (Original) A method according to claim 17, wherein said step of generating running spectral averages on said real-spectral data includes generating short-term, medium-term and delayed long-term running spectral averages of said spectral magnitudes, and storing said running spectral averages in a buffer memory.

24. (Original) A method according to claim 17, wherein said step of generating running spectral averages on said real spectral signal includes generating short-term, medium-term, long-term and delayed long-term running spectral averages of said spectral magnitudes, and storing said running spectral averages in a spectral average buffer memory.

25. (Currently Amended) A method for processing a complex spectral signal in order to demodulate and recognize a signal of interest, comprising the steps of:

storing a time history of complex spectral signal to be processed in a buffer memory;

selectively outputting a subset of said complex spectral signal stored in said buffer memory so as to represent a spectral band of signal;

receiving said selected spectral band in a two-stage synthesis filter and tuner that center tunes on a candidate signal of interest in said spectral band, filters said spectral band, and outputs a time domain representation of said candidate signal to at least one of a plurality of synthesis filter receivers;

transforming said time domain candidate signal into complex spectral data via said at least one of a plurality of synthesis filter receivers;

performing fine tuning, signal component filtering, and time domain transformation of said transformed complex spectral data into transformed signal data;

performing multiple simultaneous demodulations on said transformed signal data via a synthesis receiver controller and demodulation processor in accordance with predetermined signal of interest modulation types, wherein said step of performing multiple simultaneous demodulations includes measuring signal demodulation parameters of said transformed signal data;

scoring said measured signal demodulation parameters by closeness of match to predetermined signal of interest parameters, said predetermined signal of interest parameters specifying threshold scores for measured signal demodulation parameters to be declared successful matches; and

outputting successful signal of interest match scores.

26. (Currently Amended) A method according to claim 25, wherein said step of selectively outputting a subset of said complex spectral signal includes selecting said spectral band of signal activity subsets based on predetermined[[ly]] defined subsets.

27. (Original) A method according to claim 25, wherein said step of selectively outputting a subset of said complex spectral signal includes detecting the candidate signal of interest so as to determine a subset of the complex spectral signals with which said subset is associated, and selecting said spectral band of signal activity based on said detection.

28. (Previously Presented) A method for demodulating and recognizing a complex spectral signal of interest, comprising the steps of:

accessing said complex spectral signal to be processed stored in a buffer memory;

synthesis filtering of said complex spectral signal so as to generate a complex time domain signal based on said complex spectral signal;

demodulating said complex time domain signal;

conducting further processing of said demodulated signal to determine further signal parameters;

comparing said signal parameters to one or more predetermined signals of interest parameters and computing a weighted score based on parameter matches from said comparing; and

thresholding said score of said parameter matches between said one or more predetermined signal parameters and said demodulated signal parameters, and outputting respective signal of interest scores above threshold as indication of signal of interest recognition.

29. (Currently Amended) A method according to claim 25, wherein said step of selectively outputting said complex spectral signal stored in said buffer memory includes forming said buffer memory in a First-In-Tap-Out (FITO) configuration whereby complex signal samples with selectively variable delay levels ~~may be~~ is generated.

30. (Original) A method according to claim 25, wherein said step of outputting signal of interest match scores includes outputting signal demodulation parameters.

31. (Original) A method according to claim 25, wherein said step of synthesis filtering said complex spectral signal includes applying a two-stage overlap and add filter.

32. (Original) A method according to claim 25, wherein said step of outputting signal of interest match scores includes outputting signal complex time domain data from said two-stage synthesis filter.

33. (Currently Amended) A method according to claim 25, wherein said step of outputting signal of interest match scores includes outputting refined signal complex time domain data from said at least one of said plurality of synthesis filter receivers.

34. (Currently Amended) A method according to claim 25, wherein said step of transforming said time domain candidate signal into complex spectral data via said at least one of said plurality of synthesis filter receivers includes receiving said time

domain candidate signal repeatedly in cascaded sequence for further signal data filtering and tuning.

35. (Currently Amended) A method according to claim 25, wherein said steps of transforming said time domain candidate signal via said at least one of said plurality of synthesis filter receivers includes receiving and demodulating said time domain candidate signal in cascaded sequence using demodulated output from a first tier synthesis filter controller and demodulator as an input to a second tier synthesis filter receiver and demodulator.

36. (Currently Amended) A system for direction finding of a signal, comprising:

a plurality of wideband receivers for receiving input data from a plurality of wideband sensor sources, each of said receivers having a corresponding sensor or antenna source spatially separated from the corresponding sensors or antennas of other receivers;

a sub-band decimation module for each respective receiver, for decimating the plurality of wideband sensor sources into a plurality of sub-band data streams to be processed;

a channelizing module for Fast Fourier Transform channelizing said plurality of sub-band data streams from said plurality of wideband sensor sources into a respective plurality of complex spectral component streams;

a processing module for signal processing said ~~first sensor source~~ plurality of complex spectral component streams, including a means for determining the presence of at least one signal of interest based on multiple spectral magnitude running averages and analysis of said plurality of complex spectral component streams;

a direction finding module for determining an angle-of-arrival of the at least one signal of interest based on the analysis of said processing module and said ~~sensor source~~ plurality of complex spectral component streams; and

a high speed data router coupling each module to one another for digitally routing respective data between said sub-band decimation, channelizing, processing and direction finding modules.

37. (Original) A system according to claim 36, wherein said sub-band decimation module includes an analog-to-digital converter (ADC) for converting said plurality of wideband received sensor input data, and a plurality of digital decimators operatively connected to said ADC so as to each generate a corresponding sub-band data stream of the digitally decimated wideband sensor signal.

38. (Original) A system according to claim 36, wherein said channelizing module includes a plurality of Fast Fourier Transform (FFT) channelizers operatively connected to receive corresponding ones of said plurality of sub-band data streams and thereby generate a corresponding plurality of the complex spectral component streams.

39. (Previously Presented) A system according to claim 36, wherein said plurality of complex data streams output from the channelizing module are operatively connected to subsequent modules by a high speed data router.

40. (Original) A system according to claim 38, wherein said processing module includes a plurality of channel processors operatively connected to said data router so as to receive corresponding ones of said plurality of complex spectral component streams, each of said channel processors being formed so as to determine the presence of at least one signal of interest within the corresponding complex spectral component streams of first sensor thereof.

41. (Currently Amended) A system according to claim 40, wherein said [[means]] <u>channel processors</u> for determining the presence of at least one signal of interest includes, within each of said plurality of channel processors:

a First-In-Tap-Out (FITO) delay memory operatively connected to receive and store said corresponding complex spectral component streams from said data router of said first sensor, and

a detection processor for conducting spectral filter convolution of said corresponding complex spectral component streams stored in said FITO delay memory, and for generating spectral parameter data on said corresponding complex spectral

component stream based on spectral magnitude running averages on said corresponding complex spectral component stream.

42. (Original) A system according to claim 38, wherein each of said plurality of Fast Fourier Transform (FFT) channelizers includes means for hyperchannelizing the corresponding one of said plurality of sub-band data streams in generating said corresponding complex spectral component stream.

43. (Currently Amended) A system according to claim 42, wherein said <u>means for</u> hyperchannelizing [[means]] includes a plurality of FFT engines operatively connected to generate complex time-overlapped spectral data streams.

44. (Original) A system according to claim 38, wherein said direction finding module includes means for multichannel calibration of said complex spectral component streams from said plurality of FFT channelizers, and means for determining an angle-of-arrival of the at least one signal of interest based on the analysis of said processing module.

45. (Currently Amended) A system according to claim 41, wherein said direction finding module includes means for multichannel calibration of said complex spectral component streams from said plurality of FFT channelizers, and means for determining [[an]] <u>said</u> angle-of-arrival of the at least one signal of interest based on the spectral parameter data generated by said processing module.

46. (Original) A system according to claim 43, wherein said means for determining the angle-of-arrival includes means for implementing N-channel interferometric means to determine the angle-of-arrival.

47. (Original) A system according to claim 45, wherein said means for determining the angle-of-arrival includes means for implementing a 2-channel commutated algorithm to determine the angle-of-arrival.

48. (Original) A system according to claim 45, wherein said means for determining the angle-of-arrival includes means for implementing 3-channel comparative algorithm to determine the angle-of-arrival.

49-51. (Cancelled)

52. (Previously Presented) A method for direction finding of a signal, comprising the steps of:

providing a plurality of spatially separated antennas;

receiving a plurality of wideband source signals via said plurality of antennas;

decimating the plurality of wideband source signals into a plurality of sub-band data streams to be processed;

Fast Fourier Transform channelizing said plurality of sub-band data streams into a respective plurality of complex spectral component streams;

determining the presence of at least one signal of interest based on spectral signal activity analysis of spectral magnitudes of said plurality of complex spectral component streams of first channel source; and

determining an angle-of-arrival of the at least one signal of interest based on the spectral signal activity analysis,

wherein said step of determining the presence of at least one signal of interest includes delay-memory storing said plurality of complex spectral component streams, conducting spectral convolution of said plurality of complex spectral component streams, and generating spectral parameter data on said plurality of complex spectral component streams of first source signal data.

53. (Original) A method according to claim 52, wherein said step of generating spectral parameter data includes generating spectral magnitude running averages on said plurality of complex spectral component streams.

54. (Original) A method according to claim 52, wherein said step of generating spectral parameter data includes generating filter data on said plurality of complex spectral component streams using two-stage synthesis filter.

55-56. (Cancelled)

57. (Previously Presented) A method for direction finding of a signal, comprising the steps of:

providing a plurality of spatially separated antennas;

receiving a plurality of wideband source signals via said plurality of antennas;

decimating the plurality of wideband source signals into a plurality of sub-band data streams to be processed;

Fast Fourier Transform channelizing said plurality of sub-band data streams into a respective plurality of complex spectral component streams;

determining the presence of at least one signal of interest based on spectral signal activity analysis of spectral magnitudes of said plurality of complex spectral component streams of first channel source; and

determining an angle-of-arrival of the at least one signal of interest based on the spectral signal activity analysis,

wherein said step of determining an angle-of-arrival includes multichannel calibrating said plurality of complex spectral component streams, common filtering, and determining an angle-of-arrival of the at least one signal of interest based on the spectral analysis.

58-61. (Cancelled)

62. (Currently Amended) A method according to claim 19, wherein said step of hyperchannelizing said plurality of sub-band signals further includes a step of filtering said plurality of complex spectral components ~~streams~~ for data streams with bandwidths falling within a range or ranges of interest.

63. (Currently Amended) A method according to claim 19, wherein said step of hyperchannelizing said plurality of sub-band signals further includes a step of selecting data streams with one or more bandwidths of interest from said plurality of complex spectral components ~~streams~~.

64. (Original) A method according to claim 19, wherein said step of hyperchannelizing said plurality of sub-band signals further includes a step of decimating said plurality of complex spectral components.

65. (Currently Amended) A method according to claim 19, wherein said step of hyperchannelizing said plurality of sub-band signals further includes a step of excising data streams with one or more bandwidths of interest from said plurality of complex spectral components ~~streams~~.

66. (Currently Amended) A method according to claim 19, wherein said step of hyperchannelizing said plurality of sub-band signals further includes a step of time-sequentially windowing said plurality of complex spectral components ~~streams~~.

67. (Currently Amended) A method according to claim 19, wherein said step of hyperchannelizing said plurality of sub-band signals further includes a step of separating said ~~streams~~ plurality of sub-band signals on the basis of cyclostationary filtering from said plurality of complex spectral components ~~streams~~.

68-74. (Cancelled)

75. (Previously Presented) A system according to claim 36, further comprises a phase-coherent module for converting said sub-band data streams containing the same frequency range or ranges to be phase coherent, wherein said sensors or antenna sources sharing at least one common frequency range.

76-84. (Cancelled)

85. (Original) A method according to claim 11, further comprising a step of a priori or adaptively beamforming said ~~hyperchannelized~~ complex spectral components to enhance the signal quality of a range or ranges of said ~~hyperchannelized~~ complex spectral components.

86. (Currently Amended) A method according to claim 25, further comprises a step of a priori or adaptively beamforming said ~~hyperchannelized~~ complex spectral data so as to enhance the signal quality in order to demodulate and recognize a signal of interest.

87. (Currently Amended) A method according to claim 86, further comprises a step of a priori or adaptively combining said ~~hyperchannelized~~ complex spectral data to enhance the signal quality of a range or ranges of said ~~hyperchannelized~~ complex spectral data.

88. (Currently Amended) A method according to claim 28, wherein said synthesis filtering step further comprises a step of a priori or adaptively beamforming said complex time domain [[data]] signal.

89. (Currently Amended) A method according to claim 88, wherein said synthesis filtering step further comprises a step of a priori or adaptively combining the ~~hyperchannelized~~ complex time domain [[data]] signal to enhance the signal quality of a range or ranges of said ~~hyperchannelized~~ complex time domain [[data]] signal.

90. (Original) A system according to claim 36, wherein said processing module further comprises a beamforming module for enhancing the signal quality of a range or ranges of channelized complex spectral component streams by a priori or adaptively combining the channelized component streams, wherein said sensors or antenna sources sharing at least one common frequency range.

91-97. (Cancelled)

98. (Currently Amended) A method according to claim 86, further comprises steps of counting said ~~hyperchannelized~~ complex spectral data with reference to one pulse per second ~~time tick~~ and determining the time interval of sampling said ~~hyperchannelized~~ complex spectral data.

99. (Currently Amended) A method according to claim 28, wherein said step of conducting

further processing of said demodulated signal includes steps of interpreting said complex time domain [[data]] <u>signal</u> and determining the time of arrival of said signal.

100-101. (Cancelled)

102. (Currently Amended) A system according to claim 36, further comprises:

a ~~consistent~~ reference time frame source for synchronously converting sub-band signals from analog to digital for measuring the time of arrival of each wideband signal from each said receiver;

a time-of arrival measuring module for calibrating delay from antennas or signal sources to ADC and determining the time of arrival of each wideband signal from each said receiver; and

a module for comparing one or more pairs of said times of arrival if available, and creating Time Difference of Arrival (TDOA) measurements which are interpreted as hyperbolic lines of bearing.

103. (Cancelled)

104. (Currently Amended) A system according to claim[[s]] 36 ~~and 102~~, further comprises a position-locating module for combining multiple angle-of-arrivals or hyperbolic lines of bearing from spatially distributed antennas or signal sources, and determining geolocation of at least one signal of interest.

105. (Cancelled)

106. (New) A system according to claim 102, further comprises a position-locating module for combining multiple angle-of-arrivals or hyperbolic lines of bearing from spatially distributed antennas or signal sources, and determining geolocation of at least one signal of interest.